REMARKS/ARGUMENTS

The Non-Final Office Action dated September 20, 2006 and the references cited therein have been carefully considered. In response to the Office Action, Applicant has canceled withdrawn Claims 1-9 and 20, amended Claims 10, 14 and 17 and added new Claims 21-31, which, when considered with the remarks set forth below, are deemed to place the case with Claims 10-19 and 21-31 in condition for allowance.

Election/Restrictions

Applicant has canceled withdrawn Claims 1-9 and 20.

Claim Rejections - 35 USC §112

In the Office Action, Claims 10, 14 and 17 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner has set forth the basis for each claim rejection in the Office Action. In response, Applicant has amended Claim 10 to delete the objectionable phrase "the respective mold cavity" and has amended Claims 14 and 17 to include only one range limitation. Accordingly, it is believed that the §112 rejections to Claims 10, 14 and 17 have been overcome.

Claim Rejections - 35 USC §102 and §103

Further in the Office Action, all of the pending Claims 10-19 have been rejected based on prior art. Specifically, Claims 10-11, 17 and 19 have been rejected under 35 U.S.C. §102 (b) as being anticipated by U.S. Patent No. 5,725,819 to Onishi et al. Claims 13 and 14 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Onishi, Claims 12, 15 and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the Onishi patent in view of Rosato's Injection Molding Handbook (3rd ed.) and Claim 18 has been

rejected under 35 U.S.C. §103(a) as being unpatentable over Onishi in view of U.S. Patent No. 5,424,017 to Hinduja et al.

Claim 10

In response, Applicant has amended independent Claim 10 to clearly set forth the features of the present invention. Specifically, Claim 10 has been amended to define a method for forming plastic products, wherein an amount of plastic is introduced into a mold cavity and a moveable slide is moved in the mold cavity to compress and/or displace the plastic, wherein the speed of movement of the slide is sufficient to create adiabatic and frictional heat in the plastic, such that the temperature of the plastic rises to at least about the melting point of said plastic whereby said plastic becomes more liquid. It is respectfully submitted that none of the cited prior art references discloses the step of raising the temperature of a plastic in an injection molding process by a movable slide, as defined in amended Claim 10.

In particular, while the Onishi patent discloses an injection molding method using a mold with a moveable slide (15), the movement of the slide does not heat the plastic in the mold, as defined in Claim 10. Instead, the slide disclosed in the Onishi patent is simply utilized to form a recess in the circuit board. There is absolutely no mention in the Onishi patent of moving the slide in the mold cavity at a sufficient speed to create adiabatic and frictional heat in the plastic, such that the temperature of the plastic rises to at least about the melting point of the plastic whereby the plastic becomes more liquid.

The Examiner states that these elements of the claim are considered to be only intended use or consequence of the claimed method steps. Applicant respectfully disagrees. Specifically, Applicant points out that simply moving a slide within a mold cavity will not necessarily create adiabatic heat sufficient to raise the temperature of the plastic to the plastic's melting point, as defined in amended Claim 10. Indeed, movement of the slide disclosed in the Onishi patent has no affect whatsoever on the temperature of the plastic in the mold cavity.

This is due in part to the fact that the slide disclosed in the Onishi patent does not compress the plastic within the mold cavity and does not move at a sufficient speed to heat the plastic. Instead, according to the method disclosed in the Onishi patent, two mold halves are first brought together and then plastic material is injected between the mold halves. However, during the subsequent movement of the slide (15), the entire side of the mold forming the injection opening (13) is left open. This means that the plastic material can be at least partly forced out of the mold cavity before the cavity is closed by the gate slide (16). This is clearly evident by the description in column 4, lines 44-46 of the "removed amount" of plastic material (i.e., the amount of plastic forced out of the gate by movement of the pin 15). Thus, movement of the slide disclosed in the Onishi patent will not heat the plastic as a consequence of such movement. Accordingly, it is respectfully submitted that Claim 10, as amended patentably distinguishes over the prior art.

Claim 11

Claim 11 includes the limitations of Claim 10 and further defines setting the slide at a passage distance based on the melt of the plastic to be used in the mold cavity. It is respectfully submitted that the Onishi patent does not disclose specifically setting the distance of the slide (15) on the basis of the melt of the plastic to be used in the mold cavity. Accordingly, it is respectfully submitted that Claim 11 patentably distinguishes over the prior art.

Claim 12

Claim 12 includes the limitations of Claim 11 and further defines the step of increasing the passage distance of the slide when a plastic with a high melt is used. In rejecting Claim 12, the Examiner cites the Onishi patent in view of Rosato's Injection Molding Handbook.

Applicant points out that in Tables 4-6, for example, required clamping pressures are given for PE, PP and PS based on flow path length and section thickness, and that such values are based on a closed mold cavity with a fixed size and shape, into which one of said plastic materials is introduced. Based on this plastic material and the ratio of flow path

length to section thickness clamping forces are given. The object of the present invention is, *inter alia*, to lower the necessary clamping forces, reduce the cycle times, reduce the stresses in the plastic materials and to provide other advantages. The cited handbook does not give any indication for such effects or how to obtain these.

With specific reference to Claim 12, it is respectfully submitted that none of the cited prior art references discloses setting the distance between the frontal face of a slide and the opposite wall part of the mold cavity depending on the melt, wherein the passage distance is increased when a higher melt is used. In the Rosato handbook, it is only mentioned that a higher clamping force will be necessary when using a higher melt. Similarly, in the Onishi patent, there is no teaching or suggestion whatsoever as to any relation between retraction of the pin and the melt of the plastic. Instead, the Onishi patent only mentions that the pin may protrude into the cavity slightly as long as it does not influence with the flow path. Accordingly, it is respectfully submitted that Claim 12 patentably distinguishes over the prior art.

Claims 13 and 14

Claims 13 and 14 further define the speed of movement of the slide with respect to the overall cycle time of the injection molding process. The Examiner acknowledges that these specific features are not disclosed in the Onishi, but states that it would be obvious to one of ordinary skill in the art to reduce the molding cycle time in this manner.

Applicant respectfully points out that the speed limitations set forth in Claims 13 and 14 do not directly affect cycle time, as stated by the Examiner. Instead, movement of the slide at a speed sufficient to heat the plastic in the mold has an indirect effect on cycle time that would not at all have been obvious to one of ordinary skill in the art. In particular, by moving the slide at the speed sufficient to heat the plastic in the mold, the plastic can be introduced into the mold at a lower temperature, which results in the cycle time being reduced since less heat has to be expelled. This is yet another major benefit of the present invention.

In contrast, the Onishi patent discloses a method for molding which is totally different from that of the present invention. More particularly, from Onishi it can be understood that the speed of movement of the pin (15) is relatively slow compared to the speed of the slide in the present invention. This is evident in Onishi by the use of an open mold cavity, wherein the pin has to move up to the opposite side of the mold cavity, in order to provide a very thin bottom wall. Rapid movement of the pin in this situation would lead to strains in the plastic because of the plastic material being forced out of the mold cavity. In any event, the Onishi patent does not give any indication as to the speed of movement of the slide, as defined in Claims 13 and 14. Accordingly, it is respectfully submitted that Claims 13 and 14 patentably distinguish over the prior art.

Claims 15 and 16

Claims 15 and 16 include the limitations of Claim 10 and further respectively define a closing pressure and a filling pressure for the mold. Neither the Onishi patent nor the handbook provides for any indication that a lower clamping force can be used in a method according to the present invention than in conventional injection molding, as defined in Claim 15. Also, neither reference discloses a filling pressure, as defined in Claim 16.

In the Onishi patent, pressure is of no relevance since the mold cavity is open during (relatively slow) movement of the pin. Thus, pressure in the mold cavity disclosed in the Onishi patent remains the same. Only after movement of the pin, the mold is closed, which again maintains the same pressure. Therefore, the Onishi patent teaches away from closing the mold first and then moving the pin, because that would lead to an undesired increase of the pressure. This provides clear indication that neither the Onishi patent, nor the handbook has recognized that by moving the slide at a sufficiently high speed, the necessary clamping force can be lowered despite reduction of the volume of the closed mold cavity.

The Examiner cites pages 261-262 of the Rosato handbook as disclosing a closing pressure as defined in Claim 15. However, it is unclear from this section that the closing pressure for a mold would be smaller compared to conventional closing pressure.

With respect to Claim 16, the Examiner refers to page 224 of the Rosato handbook for a filling pressure of less than 350 bar. However, it is respectfully submitted that there is no specific injection pressure disclosed on this page. Instead, page 224 relates to the clamping force required, but no indication is given as to how high that force should be. Accordingly, it is respectfully submitted that Claims 15 and 16 patentably distinguishes over the prior art.

Claims 17 and 18

Claims 17 and 18 include the limitations of Claim 10 and further define additional processing parameters for the mold process. The Examiner states that in a method according to Onishi, at least partial solidification of the plastic material would occur during introduction of the plastic. Again however, there is absolutely no mention in the Onishi patent of adiabatic heat being generated by movement of the slide, nor is there any mention of such heat being used to replasticize the plastic material, as defined in Claim 17. As discussed in detail above, such adiabatic heating will in fact not occur with the method disclosed in the Onishi patent due to the mold cavity remaining open during movement of the pin (15).

With respect to Claim 18, the Examiner further relies on the Hinduja patent in rejecting this claim. The Hinduja patent discloses a mold having two mold parts, which together define a mold cavity and overflow spaces. In the process disclosed by the Hinduja patent, prior to closing the mold, a fibre glass mat is positioned to cover the wall of one of the mold parts, including the overflow spaces and beyond. Beginning at column 3, line 44, it is stated that according to the method of operation, the movable mold part is then moved to a distance of approximately two inches (5 centimeters) from its fully closed position where the mold blocks (31) of the upper and lower mold halves make contact. Upon reaching this position, the speed of the mold part is relatively low. A liquid material is then injected into the partially closed mold and the injection of the material is completed before the mold halves reach a fully closed position. As discussed in column 4, beginning at line 6, this is important to vent any air from the mold cavity prior to its complete closure and build up sufficient compressive pressure to cause the liquid molding compound to completely flow and wet the fibre glass reinforced mat. Thus, very high compression forces are obtained, which is contrary to the present invention.

While the Examiner correctly notes that the Hinduja patent discloses overflow spaces, this patent does not disclose using the product part formed in the overflow spaces to be used for engagement of means for expelling the product from the mold, as defined in Claim 18. Nor does the Hinduja patent give any indication for any advantage that might be obtained therewith. The only statement made by Hinduja with respect to removal of the product is in column 4, lines 27-29: "upon removal of the molded part from the lower mold half 14 the material extending into the overflow cavity may be trimmed." There is no other disclosure in this patent as to how the product is removed. Accordingly, it is respectfully submitted that Claims 17 and 18 patentably distinguish over the prior art.

New Claims 21 and 22

Applicant has further added new Claims 21 and 22. These new claims define a molding method wherein plastic material is compressed within a mold due to movement of a slide, during which movement the mold cavity is entirely closed. This means that, apart from the part to be formed by the slide, the mold cavity has already the shape and dimensions of the final product. Due to the mold cavity being closed before moving the slide, and preferably prior to injection of the plastic material, compression and adiabatic heating is possible and an optimal distribution of the plastic material will be obtained.

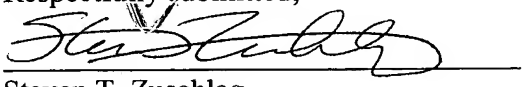
As described in detail above, in the Onishi patent, the gate (injection opening 13) of the mold is left open during movement of the slide (15), such that the injection mold is only partially closed. This means that the plastic material can be forced out of the mold cavity before the gate slide (16) is closed, resulting in the plastic material not being compressed and, therefore, no heat being generated.

In the Onishi patent, movement of the pin (15) prior to closing the mold cavity by the gate (16) is an essential feature. For example, the statement in column 4, lines 52-55 that "the board 1 having the bottom wall can be formed surely without increasing injection pressure" clearly teaches away from the claimed invention. Accordingly, it is respectfully submitted that new Claims 21 and 22, and the claims that depend therefrom, patentably distinguish over the prior art.

Conclusion

In view of the foregoing amendment and remarks, favorable consideration and allowance of the application with Claims 10-19 and 21-31 are respectfully solicited. If the Examiner believes that a telephone interview would assist in moving the application toward allowance, she is respectfully invited to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,



Steven T. Zuschlag
Registration No.: 43,309
Attorney for Applicant

HOFFMANN & BARON, LLP
6900 Jericho Turnpike
Syosset, New York 11791
(516) 822-3550
STZ/cb
234517_1